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SUBMISSION OF VERIFIED ENGLISH TRANSLATION OF PRIORITY DOCUMENT

Sir:

Applicant submits herewith is the Verified English translation of the priority document (JPA No. 41-810257 filed on April 14, 2003), to perfect Applicant's claim to priority.

Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-0481.

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[Title of the Invention] IP-PBX system and IP terminal control program

[Scope of Patent to be Claimed]

[Claim 1] An IP-PBX system that performs communication between a private branch exchange supporting IP communication and one or more IP terminals provided with an IP communication function through a network,

characterized in that said private branch exchange comprises a software control unit operating on a computer, one or more card slots into which an IP terminal control card is plugged, and a card control bus for achieving communication between said software control unit and said IP terminal control card,

wherein said software control unit is constituted by one or more first interface units connected to said IP terminals through said network, a first IP terminal control unit that converts a port number of an ID number of said IP terminal and an IP address of said IP terminal and controls said IP terminal through said first interface unit, a main control unit performing exchange processing such as call control and connection control based on a port number which is assigned to the ID number of said IP terminal, a memory means for storing a predetermined data, an IP terminal registration control means, and a local control means,

wherein said IP terminal control card is constituted by a second interface unit connected to said IP terminal through said network, and a second IP terminal control unit that reads necessary data from said memory means and converts a port number of an ID number of said IP terminal and an IP address of said IP terminal,

wherein said local control means directs a control signal whose destination is specified by said main control unit with using the port number of the ID number of said IP terminal to one IP terminal control unit among said first and second IP terminal control units, said IP terminal registration control means determines an IP terminal control unit among said first and second IP terminal

control units that controls said IP terminal, and thereby a first scheme in which said IP terminal is controlled by said software control unit and a second scheme in which said IP terminal is controlled by said IP terminal control card are mixed.

[Claim 2] The IP-PBX system according to claim 1, characterized in that said memory means includes a first memory unit in which data that is not changed automatically during a system operation is stored beforehand, and a second memory unit in which data that is automatically updated due to status change and the like of said IP terminal is stored.

[Claim 3] The IP-PBX system according to claim 2, characterized in that the data stored in said first memory unit includes an ID number data that stores the port number of the IP terminal by using the ID number of said IP terminal as a retrieval key, a scheme type indicating which of said first and second schemes is a control scheme of the IP terminal control unit by using the port numbers of said first and second IP terminal control units as a retrieval key, and an IP terminal control unit property data that stores an IP terminal registerable number,

wherein the data stored in said second memory unit includes a scheme type indicating a port number of the IP terminal control unit and which of said first and second schemes is a control scheme of the IP terminal control unit by using IP terminal control unit ID numbers of said first and second IP terminal control units as a retrieval key, an IP terminal control unit ID number data that stores a current IP terminal registered number, an IP terminal port number data that stores the IP terminal control unit ID numbers by using the port numbers of said first and second IP terminal control units as a retrieval key, and an IP terminal control unit ID number data that stores said IP terminal control unit ID numbers by using the port number of the ID number of said IP terminal as a retrieval key.

[Claim 4] The IP-PBX system according to claim 3, characterized in that, when receiving a login-request message

transmitted from said IP terminal through said first interface unit or said second interface unit and said card control bus, said IP terminal registration control means reads the IP terminal registered number of said first IP terminal control unit and the IP terminal registerable number of said first IP terminal control unit from said memory means and compares both of them, and when said IP terminal registered number is smaller than the IP terminal registerable number, it determines said first terminal control unit as the terminal control unit that controls said IP terminal, and when the IP terminal registered number of said first IP terminal control unit reaches the IP terminal registerable number, it reads the IP terminal registered number of said second IP terminal control unit and the IP terminal registerable number of said second IP terminal control unit from said memory means and compares both of them, and when said IP terminal registered number is smaller than the IP terminal registerable number, it determines said second IP terminal control unit as the terminal control unit that controls said IP terminal.

[Claim 5] The IP-PBX system according to claim 3, characterized in that, when receiving a login-request message transmitted from said IP terminal through said first interface unit or said second interface unit and said card control bus, said IP terminal registration control means reads the IP terminal registered number of said second IP terminal control unit and the IP terminal registerable number of said second IP terminal control unit from said memory means and compares both of them, and when said IP terminal registered number is smaller than the IP terminal registerable number, it determines said second IP terminal control unit as the terminal control unit that controls said IP terminal, and when the IP terminal registered number of said second IP terminal control unit reaches the IP terminal registerable number, it reads the IP terminal registered number of said first IP terminal control unit and the IP terminal registerable number of said first IP terminal control unit from said memory means and compares both of

them, and when said IP terminal registered number is smaller than the IP terminal registerable number, it determines said first terminal control unit as the terminal control unit that controls said IP terminal.

[Claim 6] The IP-PBX system according to claim 4 or 5, characterized in that, when said IP terminal registration control means determines that said first IP terminal control unit controls the IP terminal, it transmits the IP address of said IP terminal and the port number of the terminal ID number to said first IP terminal control unit and writes the IP address of said IP terminal and the port number of the terminal ID number to an IP address conversion data of said first IP terminal control unit, and when it determines that said second IP terminal control unit controls the IP terminal, it transmits the IP address of said IP terminal and the port number of the terminal ID number to said second IP terminal control unit through said card control bus and writes the IP address of said IP terminal and the port number of the terminal ID number to an IP address conversion data of said second IP terminal control unit, and said IP terminal stores a source IP address as an IP address for transmitting to said software control unit.

[Claim 7] The IP-PBX system according to claim 3, characterized in that a maintenance terminal is connected to said first interface unit through said network, wherein the maintenance terminal writes to said first memory unit an ID number data that stores the port number of the IP terminal by using the ID number of said IP terminal as a retrieval key, and when the control is performed by said first scheme, it writes said first scheme as said scheme type in said IP terminal control unit property data by using a port number of an empty card slot as a retrieval key, and when the control is performed by said second scheme, it writes said second scheme as said scheme type in said IP terminal control unit property data by using the port number of said card slot into which said IP control card is plugged as a retrieval key.

[Claim 8] An IP terminal control program in a private branch

exchange that is used in an IP-PBX system and comprises a software control unit operating on a computer, one or more card slots into which an IP terminal control card is plugged, and a card control bus for achieving communication between said software control unit and said IP terminal control card,

the IP terminal control program being characterized by making said computer on which said software control unit operates to function as:

one or more first interface units performing communication with said IP terminals through said network,

a first IP terminal control unit that converts a port number of an ID number of said IP terminal and an IP address of said IP terminal and controls said IP terminal through said first interface unit,

a main control unit performing exchange processing such as call control and connection control based on a port number which is assigned to the ID number of said IP terminal,

a write and read means for writing and reading a predetermined data to and from a memory device,

an IP terminal registration control means for determining an IP terminal control unit among said first and second IP terminal control units that controls said IP terminal, and

a local control means for directing a control signal whose destination is specified by said main control unit with using the port number of the ID number of said IP terminal to one IP terminal control unit among said first IP terminal control unit and a second IP terminal control unit that is within said IP terminal control card and converts a port number of an ID number of said IP terminal and an IP address of said IP terminal.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Belongs]

The present invention relates to an IP-PBX system and an IP terminal control program, and particularly relates to an IP-PBX

system and an IP terminal control program that performs communication between an IP-PBX that is a private branch exchange (PBX) supporting IP (Internet Protocol) communication and an IP terminal provided with an IP communication function through a LAN (Local Area Network).

[0002]

[Background Art]

An IP-PBX system that performs communication between an IP-PBX that is a private branch exchange (PBX) supporting IP communication and an IP terminal such as an IP phone and a personal computer provided with an IP communication function through a LAN is conventionally known (refer to Patent Document 1, for example). According to an IP-PBX system disclosed in the Patent Document 1, a request for IP communication is received from another exchange connected through a private line or the Internet, an IP address of the exchange of the communication request source is identified based on an IP address included in the request. Then, a terminal accommodated by the exchange of the communication request source calculates rate of the IP communication that uses a line connected to it through the private line or the Internet, with respect to each IP address of the communication source, and notifies the exchange having the IP address of the communication request source of it.

[0003]

In the conventional IP-PBX system, an IP terminal control unit plays an interface function (protocol conversion and the like) between exchange control software and an IP phone. Schemes for realizing the IP terminal control performed by the IP terminal control unit include an external card scheme that performs the IP terminal control by an IP terminal control card plugged into a card slot and a software built-in scheme that performs the IP terminal control by software operating on a main CPU (Central Processing Unit).

[0004]

According to the above-mentioned external card scheme, a plurality of IP terminal control cards are plugged into different card slots. When an IP phone logs in to the IP-PBX system, the exchange control software selects an IP terminal control unit that controls the IP terminal, and stores a port number of the card slot of the IP terminal control unit. When the exchange control software transmits an instruction to the IP phone, it designates the port number of the IP terminal control unit that is controlling the IP phone.

[0005]

On the other hand, according to the above-mentioned software built-in scheme, only one IP terminal control unit exists in the system. Therefore, when an IP phone logs in to the IP-PBX system, the IP terminal control unit that controls the IP phone is determined uniquely. All instructions to the IP phone are transmitted to the IP terminal control unit.

[0006]

[Patent Document1]

Japanese Laid-Open Patent Application JP-2002-290633

[0007]

[Problems the Invention Tries to Solve]

A first problem of the above-described conventional IP-PBX system is that the external card scheme and the software built-in scheme cannot be mixed on the same IP-PBX system. The reason is that when the external card scheme and the software built-in scheme are mixed on the same IP-PBX system, there is no way to specify the IP terminal control unit for the software built-in scheme and thus the IP terminal control unit for the software built-in scheme cannot be selected when an IP phone logs in to the system.

[0008]

A second problem is that when trying to expand IP phones in the IP-PBX system operating by the software built-in scheme and the number of the IP phones being larger than the capacity of the software built-in scheme, it is necessary to additionally provide

not only IP terminal control cards for controlling the expanded IP phones but also IP terminal control cards for IP phones which are originally controlled by the software built-in scheme. When exceeding the capacity of the software built-in scheme, all the IP phones must be changed to the external card scheme. The reason is that the external card scheme and the software built-in scheme cannot be mixed on the same IP-PBX system.

[0009]

The present invention has been made in view of the above-described problems, and it is one object of the present invention to provide an IP-PBX system and an IP terminal control program which enable mixture of the software built-in scheme that achieves the IP terminal control by the software operating on the main CPU and the external card scheme that achieves the IP terminal control by the IP terminal control card plugged into the card slot.

[0010]

[Means for Solving the Problems]

In order to achieve the above-mentioned objective, an IP-PBX system according to a first invention is an IP-PBX system that performs communication between a private branch exchange supporting IP communication and one or more IP terminals provided with an IP communication function through a network, characterized in that the private branch exchange comprises a software control unit operating on a computer, one or more card slots into which an IP terminal control card is plugged, and a card control bus for achieving communication between the software control unit and the IP terminal control card, wherein the software control unit is constituted by one or more first interface units connected to the IP terminals through the network, a first IP terminal control unit that converts a port number of an ID number of the IP terminal and an IP address of the IP terminal and controls the IP terminal through the first interface unit, a main control unit performing exchange processing such as call control and connection control based on a port number which is assigned to the ID number of the IP terminal,

a memory means for storing a predetermined data, an IP terminal registration control means, and a local control means, wherein the IP terminal control card is constituted by a second interface unit connected to the IP terminal through the network, and a second IP terminal control unit that reads necessary data from the memory means and converts a port number of an ID number of the IP terminal and an IP address of the IP terminal, wherein the local control means directs a control signal whose destination is specified by the main control unit with using the port number of the ID number of the IP terminal to one IP terminal control unit among the first and second IP terminal control units, the IP terminal registration control means determines an IP terminal control unit among the first and second IP terminal control units that controls the IP terminal, and thereby a first scheme in which the IP terminal is controlled by the software control unit and a second scheme in which the IP terminal is controlled by the IP terminal control card are mixed.

[0011]

According to the invention, the first scheme (software built-in scheme) and the second scheme (external card scheme) can be mixed. Therefore, when the number of the IP terminals is small or the traffic is light at the time of introduction of the system and the like, only the first scheme (or only the second scheme) can be used. When the number of the IP terminals and the traffic load exceed capacity of the used scheme, the system can be expanded by using the second scheme (or the first scheme) for the shortfall. Moreover, according to the invention, it can be judged by the local control means which IP terminal control unit controls the IP terminal and whether the used IP terminal control unit is the first IP terminal control unit of the first scheme or the second IP terminal control unit of the second scheme.

[0012]

Also, in order to achieve the above-mentioned objective, an IP-PBX system according to a second invention is characterized in that the memory means in the first invention includes a first memory

unit in which data that is not changed automatically during a system operation is stored beforehand, and a second memory unit in which data that is automatically updated due to status change and the like of the IP terminal is stored.

[0013]

Also, a third invention is characterized in that the data stored in the first memory unit in the second invention includes an ID number data that stores the port number of the IP terminal by using the ID number of the IP terminal as a retrieval key, a scheme type indicating which of the first and second schemes is a control scheme of the IP terminal control unit by using the port numbers of the first and second IP terminal control units as a retrieval key, and an IP terminal control unit property data that stores an IP terminal registerable number, wherein the data stored in the second memory unit includes a scheme type indicating a port number of the IP terminal control unit and which of the first and second schemes is a control scheme of the IP terminal control unit by using IP terminal control unit ID numbers of the first and second IP terminal control units as a retrieval key, an IP terminal control unit ID number data that stores a current IP terminal registered number, an IP terminal port number data that stores the IP terminal control unit ID numbers by using the port numbers of the first and second IP terminal control units as a retrieval key, and an IP terminal control unit ID number data that stores the IP terminal control unit ID numbers by using the port number of the ID number of the IP terminal as a retrieval key.

[0014]

Also, in order to achieve the above-mentioned objective, an IP-PBX system according to a fourth invention is characterized in that, when receiving a login-request message transmitted from the IP terminal through the first interface unit or the second interface unit and the card control bus, the above-mentioned IP terminal registration control means reads the IP terminal registered number of the first IP terminal control unit and the IP terminal

registerable number of the first IP terminal control unit from the memory means and compares both of them, and when the IP terminal registered number is smaller than the IP terminal registerable number, it determines the first terminal control unit as the terminal control unit that controls the IP terminal, and when the IP terminal registered number of the first IP terminal control unit reaches the IP terminal registerable number, it reads the IP terminal registered number of the second IP terminal control unit and the IP terminal registerable number of the second IP terminal control unit from the memory means and compares both of them, and when the IP terminal registered number is smaller than the IP terminal registerable number, it determines the second IP terminal control unit as the terminal control unit that controls the IP terminal. According to this invention, it is possible to additionally provide an IP terminal controlled by the second scheme if the IP terminal registered number controlled by the first scheme exceeds a predetermined IP terminal registerable number.

[0015]

Also, in order to achieve the above-mentioned objective, an IP-PBX system according to a fifth invention is characterized in that, when receiving a login-request message transmitted from the IP terminal through the first interface unit or the second interface unit and the card control bus, the IP terminal registration control means reads the IP terminal registered number of the second IP terminal control unit and the IP terminal registerable number of the second IP terminal control unit from the memory means and compares both of them, and when the IP terminal registered number is smaller than the IP terminal registerable number, it determines the second IP terminal control unit as the terminal control unit that controls the IP terminal, and when the IP terminal registered number of the second IP terminal control unit reaches the IP terminal registerable number, it reads the IP terminal registered number of the first IP terminal control unit and the IP terminal registerable number of the first IP terminal control unit from the

memory means and compares both of them, and when the IP terminal registered number is smaller than the IP terminal registerable number, it determines the first terminal control unit as the terminal control unit that controls the IP terminal. According to this invention, it is possible to additionally provide an IP terminal controlled by the first scheme if the IP terminal registered number controlled by the second scheme exceeds a predetermined IP terminal registerable number.

[0016]

Also, in order to achieve the above-mentioned objective, a sixth invention is characterized in that when the IP terminal registration control means according to the above-mentioned fourth and fifth inventions determines that the first IP terminal control unit controls the IP terminal, it transmits the IP address of the IP terminal and the port number of the terminal ID number to the first IP terminal control unit and writes the IP address of the IP terminal and the port number of the terminal ID number to an IP address conversion data of the first IP terminal control unit, and when it determines that the second IP terminal control unit controls the IP terminal, it transmits the IP address of the IP terminal and the port number of the terminal ID number to the second IP terminal control unit through the card control bus and writes the IP address of the IP terminal and the port number of the terminal ID number to an IP address conversion data of the second IP terminal control unit, and the IP terminal stores a source IP address as an IP address for transmitting to the software control unit.

[0017]

Moreover, an IP-PBX system according to a seventh invention is characterized in that a maintenance terminal is connected to the first interface unit through the network, wherein the maintenance terminal writes to the first memory unit an ID number data that stores the port number of the IP terminal by using the ID number of the IP terminal as a retrieval key, and when the control is performed by the first scheme, it writes the first scheme as

the scheme type in the IP terminal control unit property data by using a port number of an empty card slot as a retrieval key, and when the control is performed by the second scheme, it writes the second scheme as the scheme type in the IP terminal control unit property data by using the port number of the card slot into which the IP control card is plugged as a retrieval key.

[0018]

Also, in order to achieve the above-mentioned objective, an IP terminal control program according to an eighth invention, in a private branch exchange that is used in an IP-PBX system and comprises a software control unit operating on a computer, one or more card slots into which an IP terminal control card is plugged, and a card control bus for achieving communication between the software control unit and the IP terminal control card, is characterized by making the computer on which the software control unit operates to function as: one or more first interface units performing communication with the IP terminals through the network, a first IP terminal control unit that converts a port number of an ID number of the IP terminal and an IP address of the IP terminal and controls the IP terminal through the first interface unit, a main control unit performing exchange processing such as call control and connection control based on a port number which is assigned to the ID number of the IP terminal, a write and read means for writing and reading a predetermined data to and from a memory device, an IP terminal registration control means for determining an IP terminal control unit among the first and second IP terminal control units that controls the IP terminal, and a local control means for directing a control signal whose destination is specified by the main control unit with using the port number of the ID number of the IP terminal to one IP terminal control unit among the first IP terminal control unit and a second IP terminal control unit that is within the IP terminal control card and converts a port number of an ID number of the IP terminal and an IP address of the IP terminal.

[0019]

[Embodiments of the Invention]

Next, an embodiment of the present invention will be described with reference to drawings. FIG. 1 is a system configuration diagram of an embodiment of an IP-PBX system according to the present invention. The present invention is configured such that an IP-PBX 10 that is a private branch exchange supporting IP communication and IP phones 40, 41 as examples of IP terminals provided with an IP communication function are connected to a LAN 21, which enables communication of speech information and the like between the IP-PBX 10 and the IP phones 40, 41 by IP packets. It should be noted that a maintenance terminal 50 described later also is connected to the LAN 21. It should be noted that connection to external lines is not shown because it is not directly-related to the present invention.

[0020]

The IP-PBX 10 is provided with a software control unit 11 operating on a main CPU and a card slot 33 into which an IP terminal control card 31 is plugged. The software control unit 11 and the IP terminal control card 31 performs communication with each other through a card control bus 20.

[0021]

The software control unit 11 is constituted by a main control unit 12, a local control unit 13, a software built-in type IP terminal control unit 14, an LAN interface unit 15, an IP terminal registration control unit 16, a flexible data memory unit 17, and a fixed data memory unit 18. The main control unit 12 performs exchange processing such as call control and connection control, based on a port number assigned to an extension number. The local control unit 13 is located between the main control unit 12 and the IP terminal control unit 14 (or 32), and is provided with a means for directing a control signal whose destination is specified by the main control unit 12 with using the port number of the extension number to an appropriate IP terminal control unit 14 (or

32).

[0022]

The software built-in type IP terminal control unit 14 is provided with a means for converting the port number of the extension number and an IP address of an IP phone. The IP terminal registration control unit 16 is provided with a means for determining which IP terminal control unit controls the IP phone. Stored in the flexible data memory unit 17 are data that are automatically updated due to status change and the like of the IP phone, such as an IP terminal control unit ID number data, an IP terminal control unit port number data, an IP terminal port number data. The IP terminal control unit ID number data stores a port number of the IP terminal control unit, an IP terminal control scheme type and an IP terminal registered number by using an IP terminal control unit ID number as a retrieval key.

[0023]

The IP terminal control unit port number data stores the IP terminal control unit ID number by using the port number of the IP terminal control unit as a retrieval key. The IP terminal port number data stores the IP terminal control unit ID number by using the port number of the extension number as a retrieval key. Stored in the fixed data memory unit 18 are data that are set by the maintenance terminal and the like and are not changed automatically during a system operation, such as an extension number data and an IP terminal control unit property data. The extension number data stores a port number by using an extension number as a retrieval key. The IP terminal control unit property data stores an IP terminal control scheme type and an IP terminal registerable number by using the port number of the IP terminal control unit as a retrieval key.

[0024]

The IP terminal control card 31 is constituted by an external card type IP terminal control unit 32 and a LAN interface unit 34. The external card type IP terminal control unit 32 is provided with

a means for converting the port number of the extension number and the IP address of the IP phone.

[0025]

Next, a method of mixing two IP terminal control schemes of the software built-in scheme and the external card scheme in the IP-PBX system shown in FIG. 1 will be explained. The port number of the extension is written to the extension number data in the fixed data memory unit 18 by using the extension number as a key. The IP terminal control scheme type and the IP terminal registerable number are written to the IP terminal control unit property data in the fixed data memory unit 18 by using the port number of the IP terminal control unit as a key. In the case of the external card scheme, a port number of the card slot 33 into which the IP terminal control card 31 is plugged is used as the key, and the IP terminal control scheme type is set to "external card scheme". In the case of the software built-in scheme, a port number of an empty card slot is used as the key, and the IP terminal control scheme type is set to "software built-in scheme".

[0026]

When the IP terminal control unit property data is registered, the IP terminal registration control unit 16 assigns IP terminal control unit ID numbers to the software built-in IP terminal control unit 14 and the external card type IP terminal control unit 32, writes the port numbers of the IP terminal control units, the IP terminal control scheme types and the IP terminal registered numbers (initial value is 0) to the IP terminal control ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID numbers as the key, and writes the IP terminal control unit ID numbers to the IP terminal control unit port number data in the flexible data memory unit 17 by using the port numbers of the IP terminal control units as the key.

[0027]

When the IP phone 40 performs a login operation with specifying an extension number of a user 1, the IP phone 40 transmits

to the LAN interface unit 15 of the software control unit 11 a login-request message in which the extension number of the user 1 and the IP address of the IP phone 40 are set. The login-request message is transmitted to the IP terminal registration control unit 16. The IP terminal registration control unit 16 reads the IP terminal control unit ID number from the IP terminal control unit port number data in the flexible data memory unit 17 by using the port number of the software built-in type IP terminal control unit 14 as a key.

[0028]

Next, the IP terminal registered number of the software built-in type IP terminal control unit 14 is read from the IP terminal control unit ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number as a key. Moreover, the IP terminal registerable number of the software built-in type IP terminal control unit 14 is read from the IP terminal control unit property data in the fixed data memory unit 18. Then, the IP terminal registered number and the IP terminal registerable number are compared with each other.

[0029]

If the IP terminal registered number is smaller than the IP terminal registerable number, it is judged that the software built-in type IP terminal control unit 14 can control the IP phone 40, and 1 is added to the IP terminal registered number of the IP terminal control ID number data in the flexible data memory unit 17. Then, the IP terminal registration control unit 16 reads the port number of the extension from the fixed data memory unit 18 by using the extension number of the user 1 as a key, and writes the IP terminal control unit ID number of the software built-in type IP terminal control unit 14 to the IP terminal port number data in the flexible data memory unit 17 by using the port number of the extension number of the user 1 as a key.

[0030]

If the IP terminal registered number of the software built-in

type IP terminal control unit 14 reaches the IP terminal registerable number, the IP phone 40 cannot be registered to the software built-in type IP terminal control unit 14. Therefore, the IP terminal registration control unit 16 reads the IP terminal control unit ID number from the IP terminal control unit port number data in the flexible data memory unit 17 by using the port number of the external card type IP terminal control unit 32 as a key.

[0031]

Next, the IP terminal registration control unit 16 reads the IP terminal registered number of the external card type IP terminal control unit 32 from the IP terminal control ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number as a key. Further, the IP terminal registration control unit 16 reads the IP terminal registerable number of the external card type IP terminal control unit 32 from the IP terminal control unit property data in the fixed data memory unit 18, and compares the IP terminal registered number with the IP terminal registerable number.

[0032]

If the IP terminal registered number is smaller than the IP terminal registerable number, it is judged that the external card type IP terminal control unit 32 can control the IP phone 40, and 1 is added to the IP terminal registered number of the IP terminal control ID number data in the flexible data memory unit 17. Then, the IP terminal registration control unit 16 reads the port number of the extension from the fixed data memory unit 18 by using the extension number of the user 1 as a key, and writes the IP terminal control unit ID number of the external card type IP terminal control unit 32 to the IP terminal port number data in the flexible data memory unit 17 by using the port number of the extension number of the user 1 as a key.

[0033]

If the IP terminal registered number of the external card type IP terminal control unit 32 also reaches the IP terminal

registerable number, the login of the IP phone 40 is not allowed as long as another IP terminal control card is not implemented, and the login failure is notified to the IP phone 40.

[0034]

When the IP terminal control unit that controls the IP phone 40 is determined, the IP address of the IP phone 40 and the port number of the extension number of the user 1 are written to the IP address conversion data in the flexible data memory unit 17. In the case where the software built-in type IP terminal control unit 14 controls the IP phone 40, the IP terminal registration control unit 16 transmits the IP address of the IP phone 40 and the port number of the extension number of the user 1 to the software built-in type IP terminal control unit 14. The software built-in type IP terminal control unit 14 writes the IP address of the IP phone 40 and the port number of the extension number of the user 1 to an IP address conversion data of the software built-in type IP terminal control unit 14.

[0035]

In the case where the external card type IP terminal control unit 32 controls the IP phone 40, the IP terminal registration control unit 16 transmits the port number and the IP address of the IP phone 40 to the external card type IP terminal control unit 32 through the card control bus 20. The external card type IP terminal control unit 32 writes the IP address of the IP phone 40 and the port number of the extension number of the user 1 to an IP address conversion data of the external card type IP terminal control unit 32.

[0036]

Then, the IP terminal registration control unit 16 transmits login success notification to the IP phone 40. When receiving the login success notification, the IP phone 40 stores the source IP address of the login success notification as an IP address used for transmitting to the IP-PBX 10. The IP address becomes a destination IP address when a control signal is transmitted from

the IP phone 40 to the IP-PBX 10.

[0037]

In this manner, the extension number of the user 1, the IP address of the IP phone 40 and the IP terminal control unit that controls the IP phone 40 are related to each other, and thus the user 1 can use the IP phone 40 in the IP-PBX 10.

[0038]

Next, a procedure to transmit a control signal from the main control unit 12 to the IP phone 40 that the user 1 uses will be explained. First, the main control unit 12 transmits to the local control unit 13 a control signal in which the port number of the extension number of the user 1 is set. The local control unit 13 reads the IP terminal control unit ID number from the IP terminal port number data in the flexible data memory unit 17 by using the port number of the extension number of the user 1 as a key, and reads the IP terminal control scheme type and the port number of the IP terminal control unit from the IP terminal control unit ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number as a key.

[0039]

In the case where the IP terminal control scheme type is the software built-in scheme, the local control unit 13 transmits to the software built-in type IP terminal control unit 14 a control signal in which the port number of the extension number of the user 1 is set. The software built-in type IP terminal control unit 14 reads the IP address of the IP phone 40 from the IP address conversion data of the software built-in type IP terminal control unit 14 by using the port number of the extension number of the user 1 as a key, and transmits a control signal from the LAN interface unit 15 to the IP phone 40 through the LAN 21.

[0040]

In the case where the IP terminal control scheme type is the external card scheme, the local control unit 13 transmits to the card control bus 20 a control signal in which the port number of

the extension number of the user 1 is set and whose destination is set to the port number of the external card type IP terminal control unit 32. When receiving the control signal from the card control bus 20, the external card type IP terminal control unit 32 reads the IP address of the IP phone 40 from the IP address conversion data of the external card type IP terminal control unit 32 by using the port number of the extension number of the user 1 as a key, and transmits a control signal from the LAN interface unit 34 to the IP phone 40 through the LAN 21.

[0041]

Next, a procedure to transmit a control signal from the IP phone 40 that the user 1 uses to the main control unit 12 will be explained. First, the IP phone 40 transmits a control signal whose destination is set to the IP address for transmitting to the IP-PBX 10 that was stored at the time of the login. In the case where the IP phone 40 is controlled by the software built-in type IP terminal control unit 14, the IP phone 40 transmits the control signal to the software built-in type IP terminal control unit 14 through the LAN interface unit 15. The software built-in type IP terminal control unit 14 reads the port number of the extension number of the user 1 from the IP address conversion data by using the IP address of the IP phone 40 as a key, and transmits to the local control unit 13 a control signal in which the port number of the extension number of the user 1 is set.

[0042]

In the case where the IP phone 40 is controlled by the external card type IP terminal control unit 32, the IP phone 40 transmits the control signal to the external card type IP terminal control unit 32 through the LAN interface unit 34. The external card type IP terminal control unit 32 reads the port number of the extension number of the user 1 from the IP address conversion data by using the IP address of the IP phone 40 as a key, and transmits to the local control unit 13 a control signal in which the port number of the extension number of the user 1 is set.

[0043]

The local control unit 13 transmits to the main control unit 12 the control signal received from the software built-in type IP terminal control unit 14 or the external card type IP terminal control unit 32. The main control unit 12 receiving the control signal executes processing with respect to the extension number of the user 1. In this manner, the software built-in scheme that achieves the IP terminal control by the software control unit 11 and the external card scheme that achieves the IP terminal control by the IP terminal control card 31 plugged into the card slot 33 can be mixed on the same IP-PBX system.

[0044]

Next, a whole operation of the embodiment shown in FIG. 1 will be described in more detail with reference to each flowchart shown in FIG. 2, FIG. 3 and FIG. 4. First, a procedure that the software built-in type IP terminal control unit 14 and the external card type IP terminal control unit 32 become available will be explained with reference to the flowchart shown in FIG. 2.

[0045]

In FIG. 1, the extension number data is registered to the fixed data memory unit 18 by the maintenance terminal 50, and the port number of the extension is written by using the extension number as a key (Step A1 in FIG. 2). The IP terminal control unit property data is registered to the fixed data memory unit 18, and the IP terminal control scheme type and the IP terminal registerable number are written by using the port number of the IP terminal control unit as a key (Step A2 in FIG. 2).

[0046]

In the case of the external card scheme, the port number of the card slot 33 into which the IP terminal control card 31 is inserted is used as the key, and the IP terminal control scheme type is set to "external card scheme". In the case of the software built-in scheme, a port number of an empty card slot is used as the key, and the IP terminal control scheme type is set to "software

built-in scheme". When the registration of the fixed data is completed, the maintenance terminal 50 notifies the IP terminal registration control unit 16 in the software control unit 11 of the completion of the registration of the fixed data through the LAN 21 (Step A3 in FIG. 2).

[0047]

When receiving this notification, the IP terminal registration control unit 16 assigns IP terminal control unit ID numbers respectively to the software built-in type IP terminal control unit 14 and the external card type IP terminal control unit 32 (Step A4 in FIG. 2), and subsequently writes the port numbers of the IP terminal control units, the IP terminal control scheme types and the IP terminal registered numbers (initial value is 0) to the IP terminal control ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID numbers as the key (Step A5 in FIG. 2), and further writes the IP terminal control unit ID numbers to the IP terminal control unit port number data in the flexible data memory unit 17 by using the port numbers of the IP terminal control units as the key (Step A6 in FIG. 2).

[0048]

Next, a procedure that the IP phone 40 becomes available as the extension of the IP-PBX 10 will be described with reference to the flowcharts shown in FIG. 3 and FIG. 4. First, the user 1 performs a login operation with specifying an extension number to the IP phone 40 (Step B1 in FIG. 3). The IP phone 40 transmits a login-request message in which the extension number of the user 1 and the IP address of the IP phone 40 are set through the LAN interface unit 15 of the software control unit 11 to the IP terminal registration control unit 16 (Step B2 in FIG. 3).

[0049]

When receiving the login-request message, the IP terminal registration control unit 16 reads the IP terminal control unit ID number from the IP terminal control unit port number data in the flexible data memory unit 17 by using the port number of the

software built-in type IP terminal control unit 14 as a key (Step B3 in FIG. 3). Next, the IP terminal registered number of the software built-in type IP terminal control unit 14 is read from the IP terminal control unit ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number of the software built-in type IP terminal control unit 14 as a key (Step B4 in FIG. 3). Moreover, the IP terminal registerable number is read from the IP terminal control unit property data in the fixed data memory unit 18 by using the port number of the software built-in type IP terminal control unit 14 as a key (Step B5 in FIG. 3). Then, the IP terminal registered number and the IP terminal registerable number are compared with each other (Step B6 in FIG. 3).

[0050]

If the IP terminal registered number is smaller than the IP terminal registerable number, it is judged that the software built-in type IP terminal control unit 14 can control the IP phone 40, and 1 is added to the IP terminal registered number of the IP terminal control ID number data in the flexible data memory unit 17 (Step B7 in FIG. 3). Subsequently, the IP terminal registration control unit 16 reads the port number of the extension number of the user 1 from the fixed data memory unit 18 by using the extension number of the user 1 as a key (Step B8 in FIG. 3), and writes the IP terminal control unit ID number of the software built-in type IP terminal control unit 14 to the IP terminal port number data in the flexible data memory unit 17 by using the port number of the extension number of the user 1 as a key (Step B9 in FIG. 3).

[0051]

Subsequently, the IP terminal registration control unit 16 transmits the port number of the extension number of the user 1 and the IP address of the IP phone 40 to the software built-in type IP terminal control unit 14 (Step B10 in FIG. 3). The software built-in type IP terminal control unit 14 writes the IP address of the IP phone 40 and the port number of the extension number of the user 1 to the IP address conversion data of the software built-in

type IP terminal control unit 14 (Step B11 in FIG. 3), and transmits login success notification to the IP phone 40 (Step B12 in FIG. 3).

[0052]

The IP phone 40 stores the source IP address of the login success notification as an IP address used for transmitting to the IP-PBX 10 (Step B13 in FIG. 3). The IP address becomes a destination IP address when a control signal is transmitted from the IP phone 40 to the IP-PBX 10. Consequently, the software built-in type IP terminal control unit 14 becomes able to control the IP phone 40.

[0053]

On the other hand, if the IP terminal registration control unit 16 obtains in Step B6 a comparison result that the IP terminal registered number of the software built-in type IP terminal control unit 14 is equal to or larger than the IP terminal registerable number, the IP phone 40 cannot be registered to the software built-in type IP terminal control unit 14. Therefore, the IP terminal registration control unit 16 reads the IP terminal control unit ID number from the flexible data memory unit 17 by using the port number of the external card type IP terminal control unit 32 as a key (Step B14 in FIG. 4).

[0054]

Next, the IP terminal registration control unit 16 reads the IP terminal registered number of the external card type IP terminal control unit 32 from the IP terminal control ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number of the external card type IP terminal control unit 32 as a key (Step B15 in FIG. 4). Further, the IP terminal registration control unit 16 reads the IP terminal registerable number of the external card type IP terminal control unit 32 from the IP terminal control unit property data in the fixed data memory unit 18 (Step B16 in FIG. 4), and compares the IP terminal registered number with the IP terminal registerable number (Step B17 in FIG. 4).

[0055]

If the IP terminal registered number is smaller than the IP terminal registerable number as a result of the comparison in Step B17, the IP terminal registration control unit 16 judges that the external card type IP terminal control unit 32 can control the IP phone 40, and adds 1 to the IP terminal registered number of the IP terminal control ID number data in the flexible data memory unit 17 (Step B18 in FIG. 4). Subsequently, the port number of the extension is read from the fixed data memory unit 18 by using the extension number of the user 1 as a key (Step B19 in FIG. 4), and further the IP terminal control unit ID number of the external card type IP terminal control unit 32 is written to the IP terminal port number data in the flexible data memory unit 17 by using the port number of the extension number of the user 1 as a key (Step B20 in FIG. 4).

[0056]

On the other hand, a comparison result that the IP terminal registered number of the external card type IP terminal control unit 32 is equal to or larger than the IP terminal registerable number is obtained as a result of the comparison in Step B17, the login of the IP phone 40 is not allowed as long as another IP terminal control card is not implemented, and the login failure is notified to the IP phone 40 (Step B25 in FIG. 4).

[0057]

In the case where the external card type IP terminal control unit 32 controls the IP phone 40, the IP terminal registration control unit 16 transmits the port number and the IP address of the IP phone 40 to the external card type IP terminal control unit 32 through the card control bus 20 (Step B21 in FIG. 4), following the above-mentioned Step B20. The external card type IP terminal control unit 32 writes the IP address of the IP phone 40 and the port number of the extension number of the user 1 to the IP address conversion data of the external card type IP terminal control unit 32 (Step B22 in FIG. 4), and transmits login success notification to the IP phone 40 (Step B23 in FIG. 4).

[0058]

When receiving the login success notification, the IP phone 40 stores the source IP address of the login success notification as an IP address used for transmitting to the IP-PBX 10 (Step B24 in FIG. 4). The IP address becomes a destination IP address when a control signal is transmitted from the IP phone 40 to the IP-PBX 10.

[0059]

In this manner, the extension number of the user 1, the IP address of the IP phone 40 and the IP terminal control unit that controls the IP phone 40 are related to each other, and thus the user 1 can use the IP phone 40 in the IP-PBX 10.

[0060]

Next, a procedure to transmit a control signal from the main control unit 12 to an IP phone will be described with reference to a flowchart shown in FIG. 5. In the following description, the user 1 uses the IP phone 40 controlled by the software built-in type IP terminal control unit 14 and the user 2 uses the IP phone 41 controlled by the external card type IP terminal control unit 32.

[0061]

When transmitting the control signal to the IP phone 40 (user 1), the main control unit 12 transmits to the local control unit 13 the control signal in which the port number of the extension number of the user 1 is set (Step C1 in FIG. 5). When receiving the control signal, the local control unit 13 reads the IP terminal control unit ID number from the IP terminal port number data in the flexible data memory unit 17 by using the port number of the extension number of the user 1 as a key (Step C2 in FIG. 5), and reads the IP terminal control scheme type and the port number of the IP terminal control unit from the IP terminal control unit ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number as a key (Step C3 in FIG. 5).

[0062]

Subsequently, the local control unit 13 checks the read IP terminal control scheme type (Step C4 in FIG. 5). Since the IP terminal control scheme type of the IP phone 40 is the software built-in scheme, the local control unit 13 transmits to the software built-in type IP terminal control unit 14 a control signal in which the port number of the extension number of the user 1 is set (Step C5 in FIG. 5).

[0063]

The software built-in type IP terminal control unit 14 reads the IP address of the IP phone 40 from the IP address conversion data of the software built-in type IP terminal control unit 14 by using the port number of the extension number of the user 1 as a key (Step C6 in FIG. 5), and transmits a control signal from the LAN interface unit 15 to the IP phone 40 through the LAN 21 (Step C7 in FIG. 5).

[0064]

On the other hand, when transmitting the control signal to the IP phone 41 (user 2), the main control unit 12 transmits to the local control unit 13 the control signal in which the port number of the extension number of the user 2 is set (Step C1 in FIG. 5). The local control unit 13 reads the IP terminal control unit ID number from the IP terminal port number data in the flexible data memory unit 17 by using the port number of the extension number of the user 2 as a key (Step C2 in FIG. 5), and reads the IP terminal control scheme type and the port number of the IP terminal control unit from the IP terminal control unit ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number as a key (Step C3 in FIG. 5).

[0065]

The local control unit 13 checks the IP terminal control scheme type (Step C4 in FIG. 5). Here, the control signal is transmitted to the IP phone 41, and the IP terminal control scheme type of the IP phone 41 is the external card scheme. Therefore, the local control unit 13 transmits to the card control bus 20 a

control signal in which the port number of the extension number of the user 2 is set and whose destination is set to the port number of the external card type IP terminal control unit 32 (Step C8 in FIG. 5).

[0066]

When receiving the control signal from the card control bus 20, the external card type IP terminal control unit 32 reads the IP address of the IP phone 41 from the IP address conversion data of the external card type IP terminal control unit 32 by using the port number of the extension number of the user 2 as a key (Step C9 in FIG. 5), and transmits a control signal from the LAN interface unit 34 to the IP phone 41 through the LAN 21 (Step C10 in FIG. 5).

[0067]

Next, a procedure to transmit a control signal from the IP phone 40 to the main control unit 12 will be described with reference to a flowchart shown in FIG. 6. The IP phone 40 transmits the control signal to the IP-PBX 10 through the LAN 21. Here, since the IP phone 40 is controlled by the software built-in type IP terminal control unit 14, the above-mentioned control signal is transmitted to the software built-in type IP terminal control unit 14 through the LAN interface unit 15 (Step D1 in FIG. 6).

[0068]

When receiving the control signal, the software built-in type IP terminal control unit 14 reads the port number of the extension number of the user 1 from the IP address conversion data by using the IP address of the IP phone 40 as a key (Step D2 in FIG. 6), and transmits to the local control unit 13 a control signal in which the port number of the extension number of the user 1 is set (Step D3 in FIG. 6). The local control unit 13 transmits to the main control unit 12 the control signal received from the software built-in type IP terminal control unit 14 (Step D4 in FIG. 6). The main control unit 12 receiving the control signal executes processing with respect to the extension number of the user 1 (Step

D5 in FIG. 6).

[0069]

The same basically applies to a case where the IP phone 41 transmits the control signal to the IP-PBX 10. In this case, since the IP phone 41 is controlled by the external card type IP terminal control unit 32, the control signal is transmitted from the IP phone 41 to the external card type IP terminal control unit 32 through the LAN 21 and the LAN interface unit 34 (Step D6 in FIG. 6).

[0070]

When receiving the control signal, the external card type IP terminal control unit 32 reads the port number of the extension number of the user 2 from the IP address conversion data by using the IP address of the IP phone 41 as a key (Step D7 in FIG. 6), and transmits a control signal in which the port number of the extension number of the user 2 is set through the card control bus 20 to the local control unit 13 (Step D8 in FIG. 6). The local control unit 13 transmits to the main control unit 12 the control signal received from the external card type IP terminal control unit 32 (Step D9 in FIG. 6). The main control unit 12 receiving the control signal executes processing with respect to the extension number of the user 2 (Step D10 in FIG. 6).

[0071]

Next, the operation of the present embodiment will be described by using a concrete example with reference to FIG. 7. FIG. 7 is a system configuration diagram for explaining a concrete example of the IP-PBX system according to the present invention. In FIG. 7, the same reference numerals are given to the same components as those in FIG. 1. In FIG. 7, the IP address of the LAN interface unit 15 on the software control unit 11 is "192.1.1.15", the IP address of the LAN interface unit 34 on the IP terminal control card 31 is "192.1.1.34", the IP address of the IP phone 40 is "192.1.1.40", the IP address of the IP phone 41 is "192.1.1.41", the extension number of the user 1 is "2000", and the extension number of the user 2 is "3000".

[0072]

In the following description, let us consider a case where the software built-in type IP terminal control unit 14 is registered to a port number A, the external card type IP terminal control unit 32 is registered to a port number B (= port number of the card slot 33), the extension 2000 is registered to a port number C, and the extension 3000 is registered to a port number D.

[0073]

First, a concrete example of the procedure that the software built-in type IP terminal control unit 14 and the external card type IP terminal control unit 32 become available will be explained with reference to the flowchart shown in FIG. 2. The maintenance terminal 50 writes the port number (C) to the extension number data in the fixed data memory unit 18 by using the extension number (2000) as a key and writes the port number (D) by using the extension number (3000) as a key (Step A1 in FIG. 2).

[0074]

Furthermore, the IP terminal control scheme type (software built-in scheme) and the IP terminal registerable number (100) are written to the IP terminal control unit property data in the fixed data memory unit 18 by using the port number (A) of the software built-in type IP terminal control unit 14 as a key, and the IP terminal control scheme type (external card scheme) and the IP terminal registerable number (150) are written by using the port number (B) of the card slot 33 into which the IP terminal control card 31 is inserted (Step A2 in FIG. 2). When the data writing is completed, the maintenance terminal 50 notifies the IP terminal registration control unit 16 of the completion of the registration of the fixed data (Step A3 in FIG. 2).

[0075]

Next, the IP terminal registration control unit 16 assigns the IP terminal control unit ID number (10) currently unused to the software built-in IP terminal control unit 14 and similarly assigns the IP terminal control unit ID number (20) currently unused

to the external card type IP terminal control unit 32 (Step A4 in FIG. 2). Then, the port number A of the IP terminal control unit 14, the IP terminal control scheme type (software built-in scheme) and the IP terminal registered number are written to the IP terminal control ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number (10) as a key, and the port number B of the IP terminal control unit 32, the IP terminal control scheme type (external card scheme) and the IP terminal registered number are written by using the IP terminal control unit ID number (20) as a key (Step A5 in FIG. 2).

[0076]

Subsequently, the IP terminal registration control unit 16 writes the IP terminal control unit ID number (10) to the IP terminal control unit port number data in the flexible data memory unit 17 by using the port number (A) of the software built-in type IP terminal control unit 14 as a key, and writes the IP terminal control unit ID number (20) by using the port number (B) of the external card type IP terminal control unit 32 as a key (Step A6 in FIG. 2).

[0077]

Next, a concrete example of the procedure that the IP phone 40 becomes available as the extension of the IP-PBX 10 will be described with reference to the foregoing flowcharts shown in FIG. 3 and FIG. 4. When the IP phone 40 in FIG. 7 performs a login operation with specifying the extension number (2000) of the user 1 (Step B1 in FIG. 3), the IP phone 40 uses the IP address (192.1.1.15) of the LAN interface unit 15 of the software control unit 11, which is stored in the IP phone 40 beforehand, to transmit to the IP terminal registration control unit 16 a login-request message in which the extension number (2000) of the user 1 and the IP address (192.1.1.40) of the IP phone 40 are set (Step B2 in FIG. 3).

[0078]

When receiving the login-request message, the IP terminal registration control unit 16 reads the IP terminal control unit

ID number (10) from the IP terminal control unit port number data in the flexible data memory unit 17 by using the port number (A) of the software built-in type IP terminal control unit 14 as a key (Step B3 in FIG. 3). Next, the IP terminal registered number of the software built-in type IP terminal control unit 14 is read from the IP terminal control unit ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number (10) as a key (Step B4 in FIG. 3).

[0079]

Moreover, the IP terminal registration control unit 16 reads the IP terminal registerable number (100) from the IP terminal control unit property data in the fixed data memory unit 18 by using the port number (A) of the software built-in type IP terminal control unit 14 as a key (Step B5 in FIG. 3), and makes a comparison between the IP terminal registered number and the IP terminal registerable number (100) (Step B6 in FIG. 3). If the IP terminal registered number is smaller than the IP terminal registerable number (100), for example, if the IP terminal registered number is 50, it is judged that the software built-in type IP terminal control unit 14 can control the IP phone 40, and 1 is added to the IP terminal registered number of the IP terminal control ID number data in the flexible data memory unit 17 to be 51 (Step B7 in FIG. 3).

[0080]

Next, the port number (C) of the extension is read from the fixed data memory unit 18 by using the extension number (2000) of the user 1 as a key (Step B8 in FIG. 3), and the IP terminal control unit ID number (10) of the software built-in type IP terminal control unit 14 is written to the IP terminal port number data in the flexible data memory unit 17 by using the port number (C) of the extension number (2000) of the user 1 as a key (Step B9 in FIG. 3).

[0081]

On the other hand, for example, if the IP terminal registered number of the software built-in type IP terminal control unit 14 is equal to the IP terminal registerable number (100), the IP phone

40 cannot be registered to the software built-in type IP terminal control unit 14. Therefore, the IP terminal control unit ID number (20) is read from the flexible data memory unit 17 by using the port number (B) of the external card type IP terminal control unit 32 as a key (Step B14 in FIG. 4). Next, the IP terminal registered number of the external card type IP terminal control unit 32 is read from the IP terminal control ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number (20) of the external card type IP terminal control unit 32 as a key (Step B15 in FIG. 4).

[0082]

Further, the IP terminal registration control unit 16 reads the IP terminal registerable number (150) of the external card type IP terminal control unit 32 from the IP terminal control unit property data in the fixed data memory unit 18 (Step B16 in FIG. 4), and makes a comparison between the IP terminal registered number and the IP terminal registerable number (150) (Step B17 in FIG. 4). If the IP terminal registered number is smaller than the IP terminal registerable number (150), for example, if the IP terminal registered number is 120, it is judged that the external card type IP terminal control unit 32 can control the IP phone 40, and 1 is added to the IP terminal registered number of the IP terminal control ID number data in the flexible data memory unit 17 to be 121 (Step B18 in FIG. 4).

[0083]

Subsequently, the IP terminal registration control unit 16 reads the port number (C) of the extension from the fixed data memory unit 18 by using the extension number (2000) of the user 1 as a key (Step B19 in FIG. 4), and writes the IP terminal control unit ID number (20) of the external card type IP terminal control unit 32 to the IP terminal port number data in the flexible data memory unit 17 by using the port number (C) of the extension number (2000) of the user 1 as a key (Step B20 in FIG. 4).

[0084]

If the IP terminal registered number of the external card type IP terminal control unit 32 also is equal to the IP terminal registerable number (150) in the comparison at Step B17, the login of the IP phone 40 is not allowed as long as an IP terminal control card other than the IP terminal control card 31 does not exist in the IP-PBX 10, and the login failure is notified to the IP phone 40 (Step B25 in FIG. 4). If there exists an IP terminal control card other than the IP terminal control card 31, registration to the IP terminal control card is tried in the same manner as described above.

[0085]

In the case where the software built-in type IP terminal control unit 14 controls the IP phone 40, the IP terminal registration control unit 16 transmits the port number (C) of the extension number (2000) of the user 1 and the IP address (192.1.1.40) of the IP phone 40 to the software built-in type IP terminal control unit 14 (Step B10 in FIG. 3). The software built-in type IP terminal control unit 14 writes the IP address (192.1.1.40) of the IP phone 40 and the port number (C) of the extension number (2000) of the user 1 to the IP address conversion data of the software built-in type IP terminal control unit 14 (Step B11 in FIG. 3), and transmits login success notification to the IP phone 40 (Step B12 in FIG. 3).

[0086]

When receiving the login success notification, the IP phone 40 stores the source IP address (192.1.1.15) of the login success notification as an IP address used for transmitting to the IP-PBX 10 (Step B13 in FIG. 3). The IP address becomes a destination IP address when a control signal is transmitted from the IP phone 40 to the IP-PBX 10.

[0087]

In the case where the external card type IP terminal control unit 32 controls the IP phone 40, the IP terminal registration control unit 16 transmits the port number (C) of the extension number

(2000) of the user 1 and the IP address (192,1.1.40) of the IP phone 40 to the external card type IP terminal control unit 32 through the card control bus 20 (Step B21 in FIG. 4). The external card type IP terminal control unit 32 writes the IP address (192.1.1.40) of the IP phone 40 and the port number (C) of the extension number (2000) of the user 1 to the IP address conversion data of the external card type IP terminal control unit 32 (Step B22 in FIG. 4), and transmits login success notification to the IP phone 40 (Step B23 in FIG. 4).

[0088]

When receiving the login success notification, the IP phone 40 stores the source IP address (192.1.1.34) of the login success notification as an IP address used for transmitting to the IP-PBX 10 (Step B24 in FIG. 4). The IP address becomes a destination IP address when a control signal is transmitted from the IP phone 40 to the IP-PBX 10. In this manner, the extension number of the user 1, the IP address of the IP phone 40 and the IP terminal control unit that controls the IP phone 40 are related to each other, and thus the user 1 can use the IP phone 40 in the IP-PBX 10.

[0089]

Next, a concrete example of the procedure to transmit a control signal from the main control unit 12 to an IP phone will be described. In the following description, the user 1 uses the IP phone 40 controlled by the software built-in type IP terminal control unit 14 (the IP terminal control unit ID number is 10), and the user 2 uses the IP phone 41 controlled by the external card type IP terminal control unit 32 (the IP terminal control unit ID number is 20).

[0090]

When transmitting the control signal to the IP phone 40 (user 1), the main control unit 12 transmits to the local control unit 13 the control signal in which the port number (C) of the extension number (2000) of the user 1 is set (Step C1 in FIG. 5). The local control unit 13 reads the IP terminal control unit ID number (10)

from the IP terminal port number data in the flexible data memory unit 17 by using the port number (C) of the extension number of the user 1 as a key (Step C2 in FIG. 5), and reads the IP terminal control scheme type and the port number (A) of the IP terminal control unit 14 from the IP terminal control unit ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number (10) as a key (Step C3 in FIG. 5).

[0091]

Subsequently, the local control unit 13 checks the IP terminal control scheme type (Step C4 in FIG. 5). Here, the IP terminal control scheme type is the software built-in scheme. Therefore, a control signal in which the port number (C) of the extension number (2000) of the user 1 is set is transmitted to the software built-in type IP terminal control unit 14 (Step C5 in FIG. 5). The software built-in type IP terminal control unit 14 reads the IP address (192.1.1.40) of the IP phone 40 from the IP address conversion data of the software built-in type IP terminal control unit 14 by using the port number (C) of the extension number (2000) of the user 1 as a key (Step C6 in FIG. 5), and transmits a control signal from the LAN interface unit 15 to the IP phone 40 (Step C7 in FIG. 5).

[0092]

When the software control unit 11 transmits the control signal to the IP phone 41 (user 2), the main control unit 12 transmits to the local control unit 13 the control signal in which the port number (D) of the extension number (3000) of the user 2 is set (Step C1 in FIG. 5). The local control unit 13 reads the IP terminal control unit ID number (20) from the IP terminal port number data in the flexible data memory unit 17 by using the port number (D) of the extension number (3000) of the user 2 as a key (Step C2 in FIG. 5), and reads the IP terminal control scheme type and the port number of the IP terminal control unit from the IP terminal control unit ID number data in the flexible data memory unit 17 by using the IP terminal control unit ID number (20) as a key (Step C3 in FIG. 5).

[0093]

Subsequently, the local control unit 13 checks the IP terminal control scheme type (Step C4 in FIG. 5). Here, the IP terminal control scheme type is the external card scheme. Therefore, the local control unit 13 transmits to the card control bus 20 a control signal in which the port number (D) of the extension number (3000) of the user 2 is set and whose destination is set to the port number (B) of the external card type IP terminal control unit 32 (Step C8 in FIG. 5). When receiving the control signal from the card control bus 20, the external card type IP terminal control unit 32 reads the IP address (192.1.1.41) of the IP phone 41 from the IP address conversion data of the external card type IP terminal control unit 32 by using the port number (D) of the extension number (3000) of the user 2 as a key (Step C9 in FIG. 5), and transmits a control signal from the LAN interface unit 34 to the IP phone 41 (Step C10 in FIG. 5).

[0094]

Next, a concrete example of the procedure to transmit a control signal from the IP phones 40, 41 to the main control unit 12 will be described with reference to FIG. 6 and FIG. 7. The IP phone 40 in FIG. 7 transmits the control signal, whose destination is set to the IP address (192.1.1.15) for transmitting to the IP-PBX 10 which was stored at the time of login, to the software built-in type IP terminal control unit 14 through the LAN interface unit 15 (Step D1 in FIG. 6).

[0095]

The software built-in type IP terminal control unit 14 reads the port number (C) of the extension number (2000) of the user 1 from the IP address conversion data by using the IP address (192.1.1.40) of the IP phone 40 as a key (Step D2 in FIG. 6), and transmits to the local control unit 13 a control signal in which the port number (C) of the extension number (2000) of the user 1 is set (Step D3 in FIG. 6). When receiving the control signal from the software built-in type IP terminal control unit 14, the local

control unit 13 transmits the received control signal to the main control unit 12 (Step D4 in FIG. 6). The main control unit 12 receiving the control signal executes processing with respect to the extension number (2000) of the user 1 (Step D5 in FIG. 6).

[0096]

On the other hand, when the IP phone 41 transmits the control signal, whose destination is set to the IP address (192.1.1.34) for transmitting to the IP-PBX 10 which was stored at the time of login, to the external card type IP terminal control unit 32 through the LAN 21 and the LAN interface unit 34 (Step D6 in FIG. 6), the external card type IP terminal control unit 32 reads the port number (D) of the extension number (3000) of the user 2 from the IP address conversion data by using the IP address (192.1.1.41) of the IP phone 41 as a key (Step D7 in FIG. 6), and transmits a control signal in which the port number (D) of the extension number (3000) of the user 2 is set through the card control bus 20 to the local control unit 13 (Step D8 in FIG. 6).

[0097]

When receiving the control signal from the external card type IP terminal control unit 32, the local control unit 13 transmits the received control signal to the main control unit 12 (Step D9 in FIG. 6). The main control unit 12 receiving the control signal executes processing with respect to the extension number (300) of the user 2 (Step D10 in FIG. 6).

[0098]

According to the present embodiment, as described above, the software built-in scheme and the external card scheme can be mixed on the same IP-PBX system. Therefore, when the number of terminals is small or the traffic is light at the time of introduction of the system and the like, only the software built-in scheme can be used. When the number of the IP phones and the traffic load exceed capacity of the software built-in scheme, the system can be expanded by additionally providing the IP terminal control cards 31 for the shortfall. Moreover, the program of the main control unit 12 can

control the IP phones 40 and 41 without regard to the IP terminal control units 14 and 32 that control the IP phones 40 and 41. Therefore, addition and change of the IP phone supplementary service can be achieved by merely modifying the main control unit program.

[0099]

It should be noted that the present invention is not limited to the above-described embodiments. For example, the IP terminal to be controlled can be a personal computer and the like provided with the IP communication function, other than the IP phones 40 and 41. Also, in the above-described embodiments, when the number of IP phones (or the traffic load) exceeds the connectable number of the software built-in scheme, they can be connected by the external card scheme. However, it is also possible that when the number of the external card schemes (or the traffic load) exceeds the connectable number of the external cardscheme, the IP phones are connected by the software built-in scheme.

[0100]

Moreover, the maintenance terminal 50 may be directly connected to the IP-PBX 10 without through the LAN 21. Furthermore, the number of the LAN interface unit 15 or the number of card slot 33 can be plural. In this case, the connection destinations can be either different LANs or the same LAN. Also, to which of the first IP terminal control unit and the second terminal control unit priority is given depends on setting of the IP-PBX 10, irrespective of whether the login-request message is received by the LAN interface unit 15 or the LAN interface unit 34.

[0101]

[Advantage of Invention]

According to the present invention, as described above, the first scheme (software built-in scheme) and the second scheme (external card scheme) can be mixed. Therefore, when the number of the IP terminals is small or the traffic is light at the time of introduction of the system and the like, only the first scheme (or only the second scheme) can be used. When the number of the

IP terminals and the traffic load exceed capacity of the used scheme, the system can be expanded by using the second scheme (or the first scheme) for the shortfall. Therefore, it is possible to provide a system in accordance with the number of the IP terminals in the IP-PBX system and the traffic load. For example, in a case where IP terminals exceeding the capacity of the first scheme are additionally provided in the IP-PBX system operated by the first scheme, IP terminal control cards for the additional IP terminals just need to be prepared. It is not necessary to add IP terminal control cards for the IP terminals that have been controlled by the first scheme until then.

[0102]

Moreover, according to the present invention, it can be judged by the local control means which IP terminal control unit controls the IP terminal and whether the used IP terminal control unit is the first IP terminal control unit of the first scheme or the second IP terminal control unit of the second scheme. Therefore, the program of the main control unit can control the IP terminal without regard to the IP terminal control unit that is controlling the IP terminal. It is thus possible to add and change the IP terminal supplementary service by merely modifying the main control unit program.

[Brief Description of the Drawings]

[FIG. 1]

A system configuration diagram of an embodiment of an IP-PBX system according to the present invention.

[FIG. 2]

A flowchart for explaining procedures that the software built-in type IP terminal control unit and the external card type IP terminal control unit become available in the IP-PBX system according to the present invention.

[FIG. 3]

A flowchart (first) for explaining procedures that an IP phone becomes available as an extension of the IP-PBX in the IP-PBX system

according to the present invention.

[FIG. 4]

A flowchart (second) for explaining procedures that an IP phone becomes available as an extension of the IP-PBX in the IP-PBX system according to the present invention.

[FIG. 5]

A flowchart for explaining procedures that a control signal is transmitted from a main control unit to an IP phone in the IP-PBX system according to the present invention.

[FIG. 6]

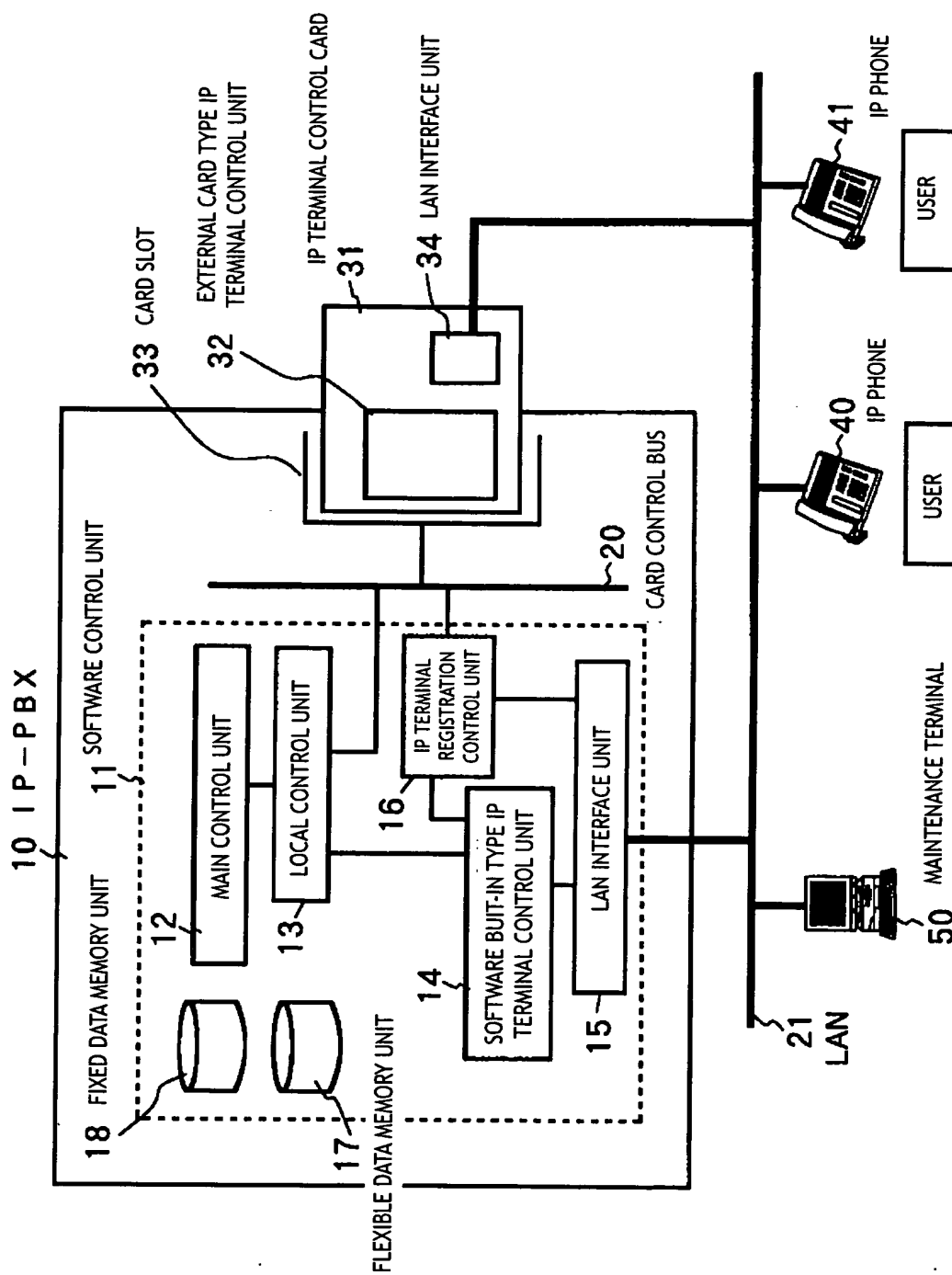
A flowchart for explaining procedures that a control signal is transmitted from an IP phone to a main control unit in the IP-PBX system according to the present invention.

[FIG. 7]

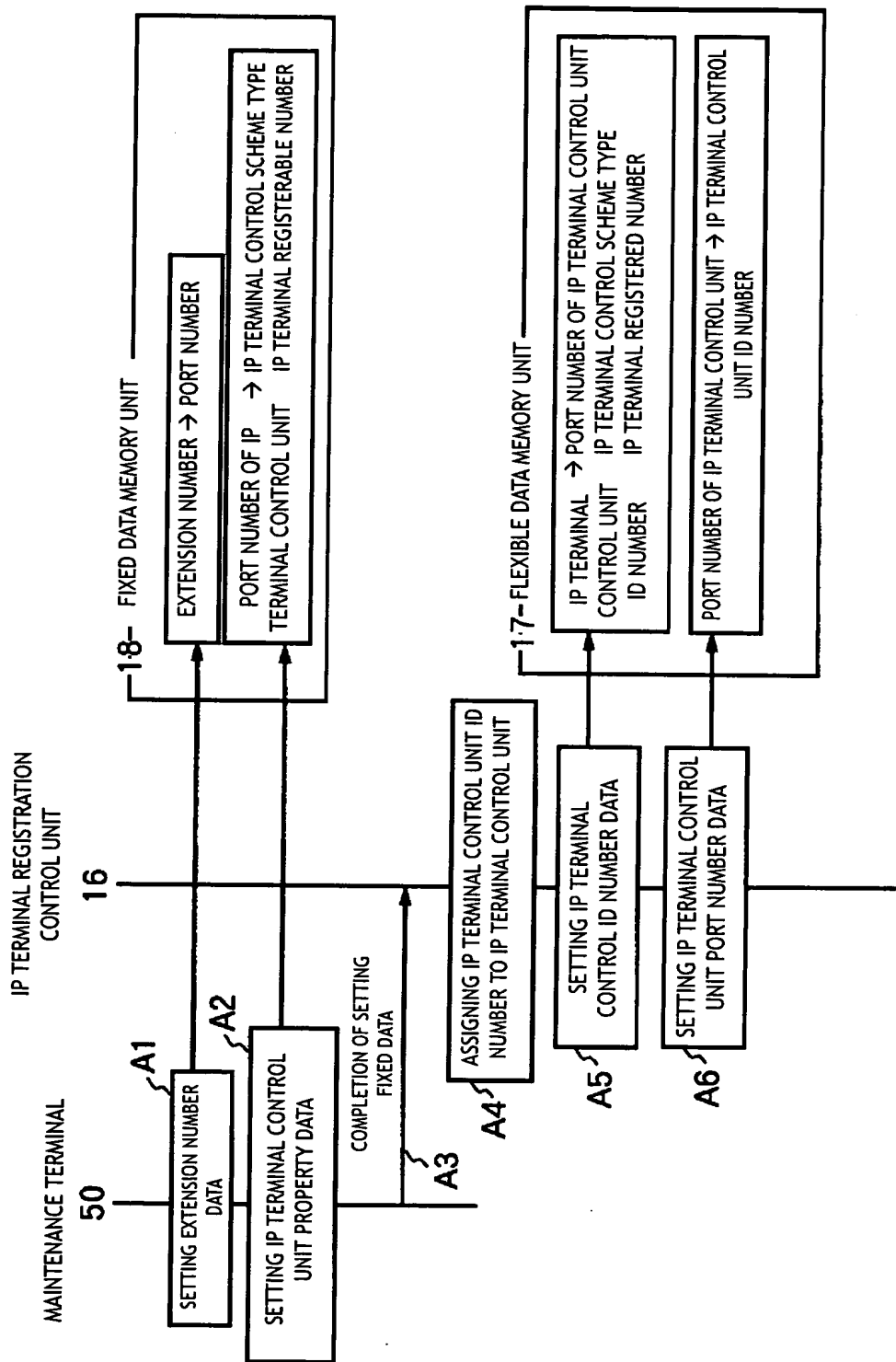
A system configuration diagram for explaining a concrete example of the embodiment of the IP-PBX system according to the present invention.

[Description of the Reference Numerals]

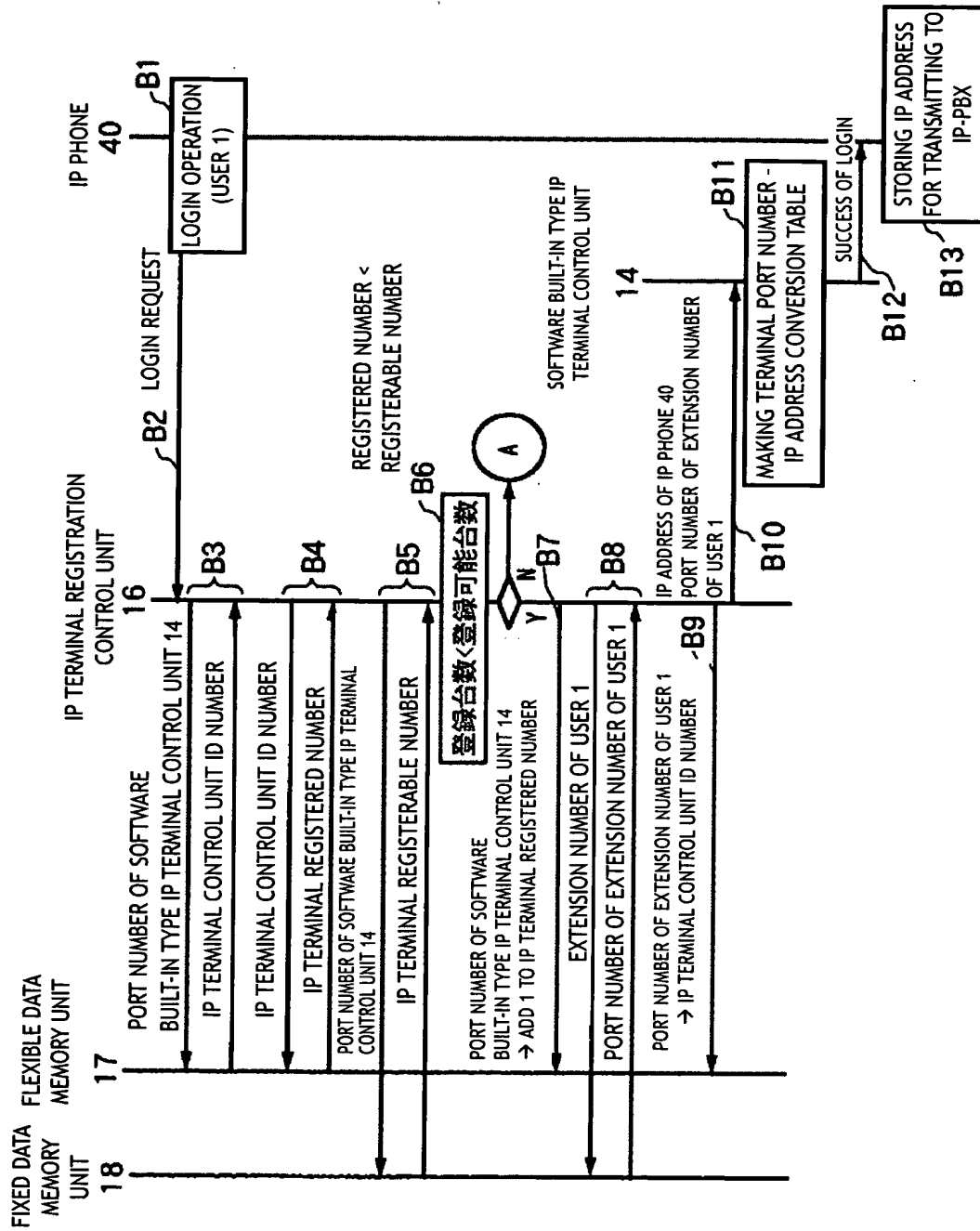
- 10 IP-PBX
- 11 software control unit
- 12 main control unit
- 13 local control unit
- 14 software built-in type IP terminal control unit
- 15, 34 LAN interface unit
- 16 IP terminal registration control unit
- 17 flexible data memory unit
- 18 fixed data memory unit
- 20 card control bus
- 21 LAN (Local Area Network)
- 31 IP terminal control card
- 32 external card type IP terminal control unit
- 33 card slot
- 40, 41 IP phone
- 50 maintenance terminal



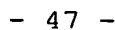
[FIG. 2]



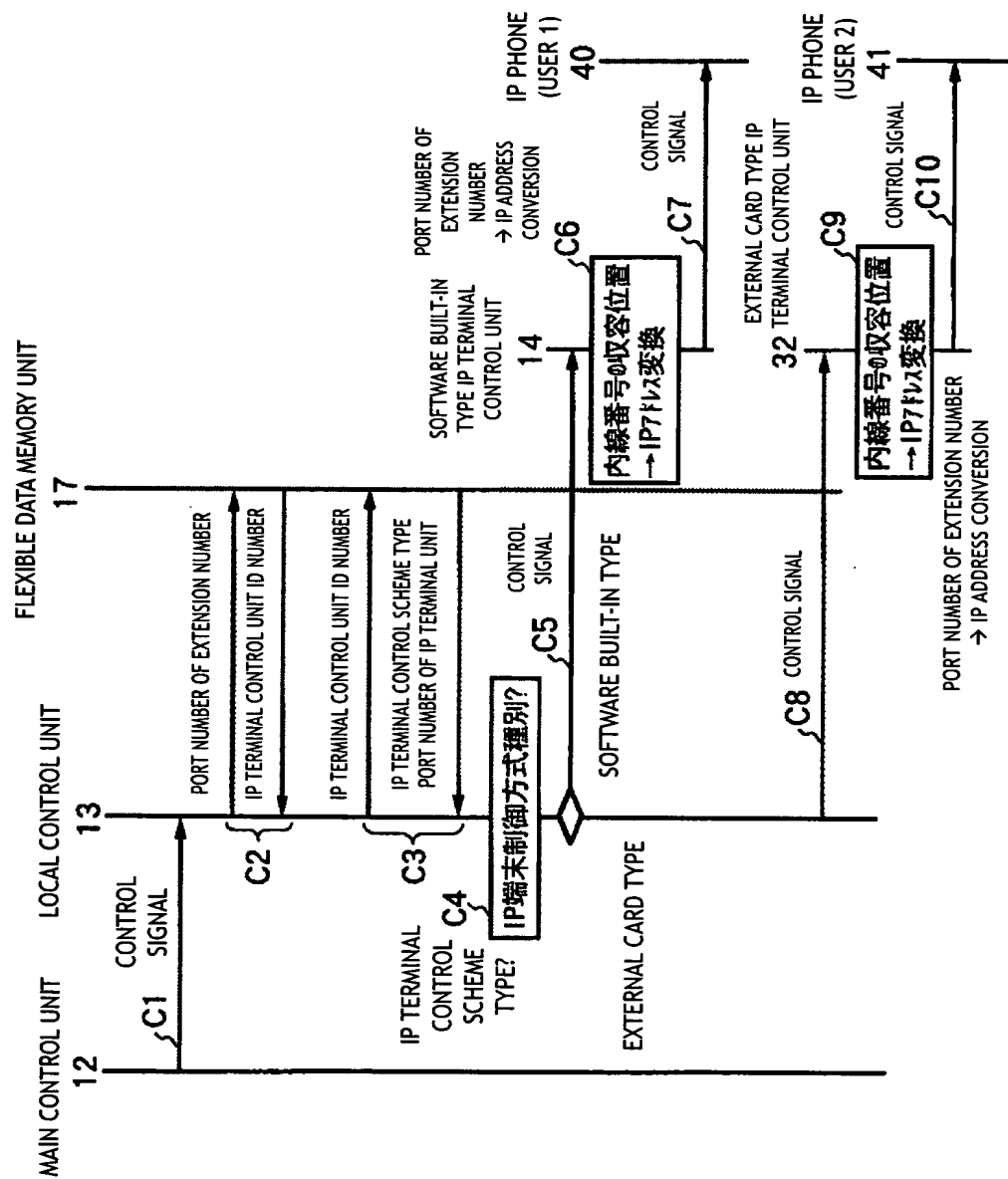
[FIG. 3]



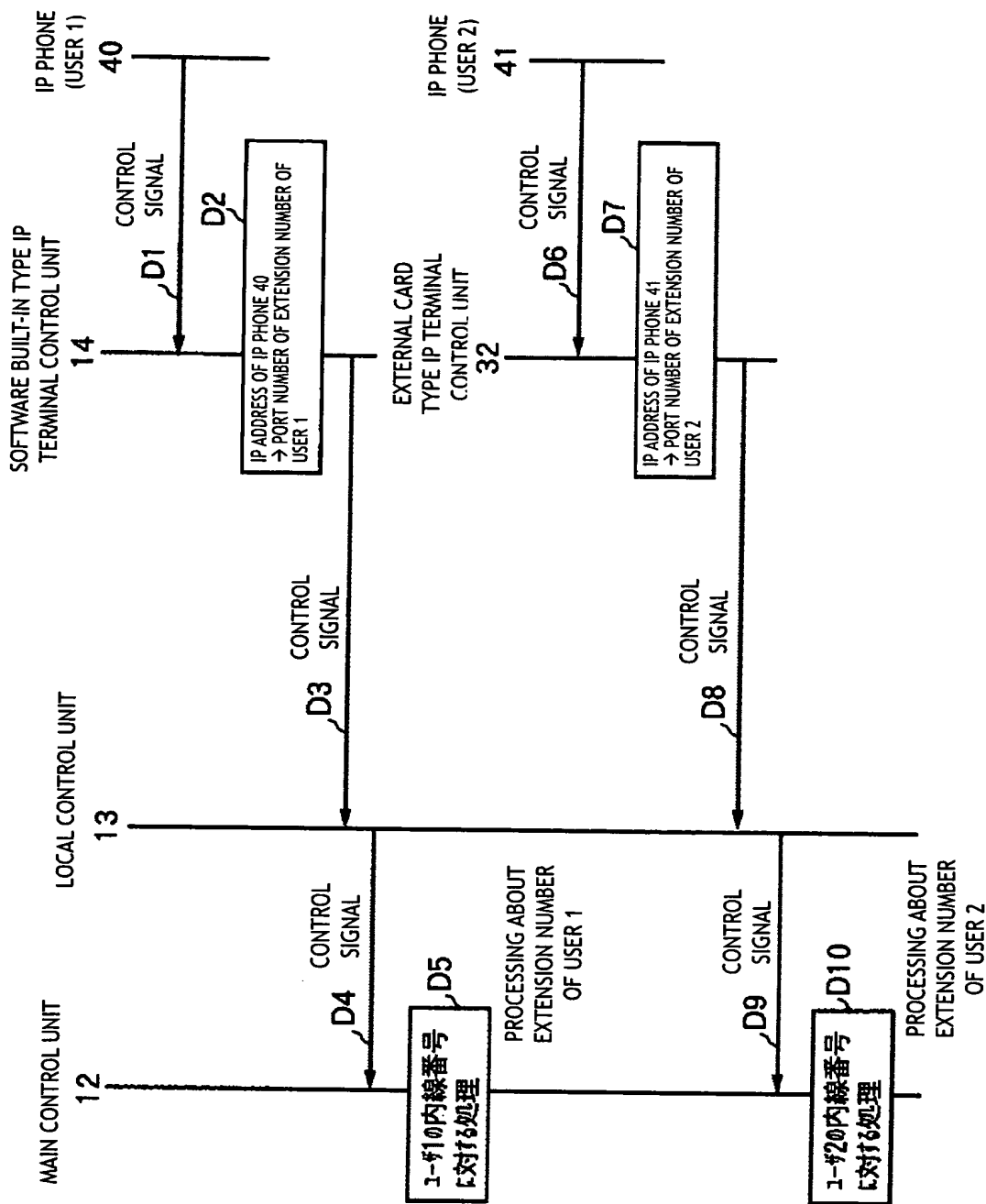
IP TERMINAL REGISTRATION
CONTROL UNIT



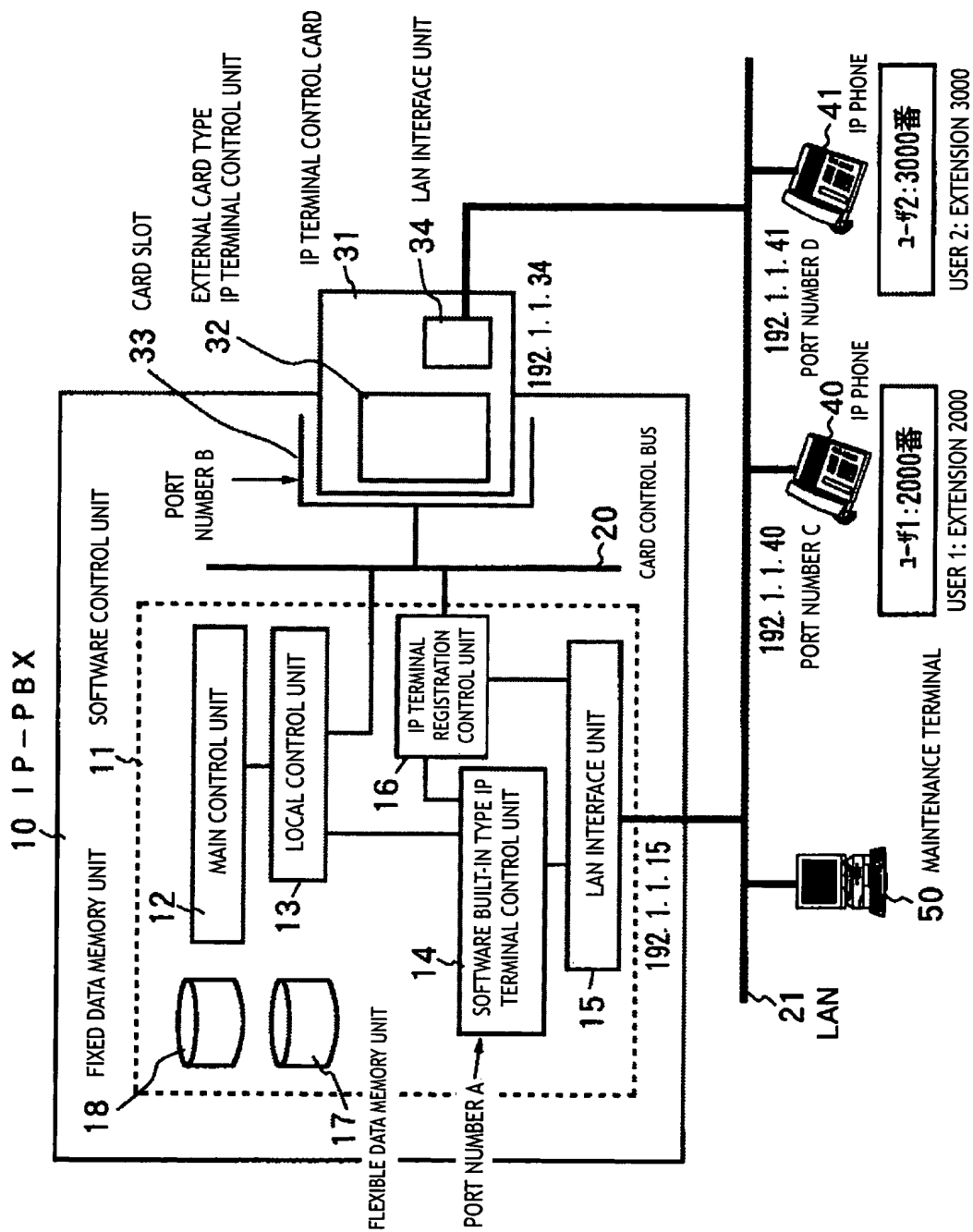
[FIG. 5]



[FIG. 6]



[FIG. 7]



[Document Name] Abstract

[Abstract]

[Problems] Conventionally, the external card scheme and the software built-in scheme cannot be mixed on the same IP-PBX system. Also, when IP phones exceeding capacity of the software built-in scheme are additionally provided, IP terminal control cards for all the IP phones need to be prepared.

[Solving Means] A local control unit 13 in an IP-PBX 10 directs a control signal whose destination is specified by a main control unit 12 with using a port number of an extension number of IP phones 40 and 41 to either IP terminal control unit 14 or 32. An IP terminal registration control unit 16 determines an IP terminal control unit among the IP terminal control units 14 and 32 that controls the IP terminal, and thereby the software built-in scheme in which the IP phones 40 and 41 are controlled by a software control unit 11 and the external card scheme in which the IP phones 40 and 41 are controlled by IP terminal control cards 31 can be mixed.

[Selected Drawing] FIG. 1